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Solution by G. W. GREENWOOD, M. A., Dunbar, Pa.

Let the circle be tangent at the point  $P \equiv (a \cos \theta, b \sin \theta)$  to the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1,$$

and let the chord of contact of the other two points touch at  $Q$  the ellipse

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = \lambda^2.$$

Since the tangents at  $P$  and  $Q$  are equally inclined to the axes, the coördinates of  $Q$  are  $(\lambda a \cos \theta, -\lambda b \sin \theta)$ , or  $(-\lambda a \cos \theta, \lambda b \sin \theta)$ . Since a chord of a conic, tangent to a similar coaxial conic, is bisected at the point of contact, the center of the circle lies on the normal at  $Q$ ; and also lies on the normal at  $P$ ; i. e., on

$$\frac{ax}{\cos \theta} + \frac{by}{\sin \theta} = \pm \lambda(a^2 - b^2), \text{ and } \frac{ax}{\cos \theta} - \frac{by}{\sin \theta} = a^2 - b^2.$$

Hence the required locus is

$$\frac{4a^2x^2}{(1 \pm \lambda)^2} + \frac{4b^2y^2}{(1 \mp \lambda)^2} = a^2 - b^2.$$

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## PROBLEMS FOR SOLUTION.

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### ALGEBRA.

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270. Proposed by GEORGE H. HALLETT, Ph. D., Assistant Professor of Mathematics in The University of Pennsylvania, Philadelphia, Pa.

Find the simplest integral form of the sum  $y(y-1)\dots(y-x) + 2y(2y-1)\dots(2y-x) + \dots + zy(zy-1)\dots(zy-x)$ .\*

271. Proposed by L. E. NEWCOMB, Los Gatos, California.

Sum the series  $\frac{a}{b} + \frac{a^3}{3b^3} + \frac{a^5}{5b^5} + \dots$  to  $\infty$ ,  $b > a$ .

272. Proposed by PROF. R. D. CARMICHAEL, Anniston, Ala.

Prove that the relations  $x = \frac{ar+bs}{\lambda} = \frac{as-br}{\mu} = \frac{a\gamma-b\mu}{r} = \frac{a\mu+b\lambda}{s}$  between the finite real quantities  $x, a, b, r, s, \lambda, \mu$  requires that  $x^2 = a^2 + b^2$ .

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\*This series is of frequent occurrence in certain investigations in Group Theory. Ed.